

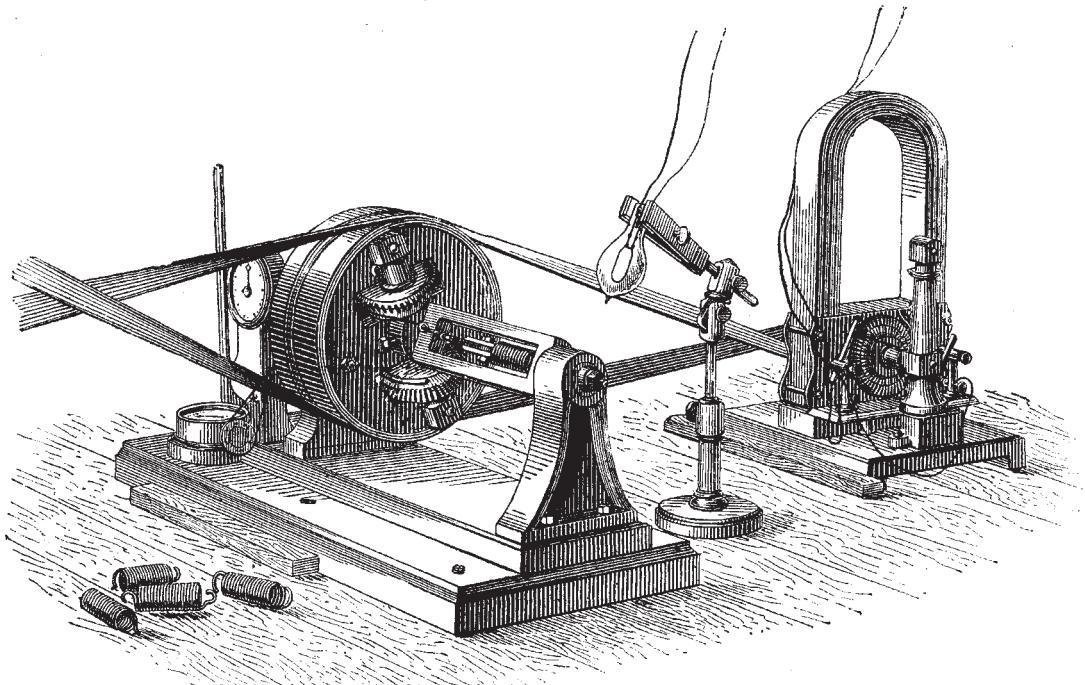
out of them quite unaltered. However, so as to leave no doubt as to the accuracy of the readings of the ergometer, the instrument is finally calibrated by another method, which is new; it is as follows:—

Let a prime-mover (a water-wheel appears to be the most steady) drive the transmission ergometer, and let the ergometer drive a pulley on a shaft embraced by a suitable friction ergometer, such as a Prony brake or an Appold's brake, and let the work done against friction be calculated. This should agree with the results of the transmission machine. If it does, we may conclude that it has been correctly calibrated. The advantage of this method is that the transmission machine is tested while

running in its usual condition. When testing a dynamo care should be taken that the speed indicator be well attached to the shaft the velocity of which it is measuring. A piece of coiled spring, such as is used in a dentist's lathe, answers well to connect it to the machine.

The leading feature of this instrument is the position of the spring in it. The axis of the spring and of the shaft coincide; the result of this is that it is hardly at all affected by centrifugal force. When springs of slight pull are used and the ergometer is driven at a great velocity, the deformation is considerable, and would introduce considerable error into the result.

The deformation of the spring has been fully appre-



Smith's Transmission Ergometer.

ciated by Schuckert, and therefore he has placed the spiral springs of his ergometer in cylindrical cases.

When the spring is placed with its axis coincident with that of the machine, no such error can be introduced, and the friction of a spring against a case is avoided.

When a continuous record of work is required, a cylinder, not shown in the figure, is placed at the dial end of the instrument, and is driven at a speed proportional to the speed of driving. It carries a band of paper which receives a continuous trace from three self-feeding ink-pens: one pen is attached to the lever which is moved by the extension of the spring, and it writes ordinates directly

proportional to the amount of extension of the spring at any instant; the second pen, attached to the lever of an electro-magnet magnetised by a current controlled by a seconds pendulum, describes a V-shaped mark at each second; the third pen traces a datum line to which the ordinates are perpendicular. The area traced out is of course the product of the two variables, and is proportional to the total work transmitted. The recording drum may be made to revolve at any convenient ratio to the revolutions of the belt wheels. We are indebted to Mr. Smith for the loan of the figure which illustrates this notice.

#### NOTES

WE are authorised to state that there is no truth in the rumour that Mr. Oscar Dickson intends to equip an Antarctic Expedition under the command of Baron Nordenskjöld.

THE Rev. Dr. Salmon, Regius Professor of Divinity in Trinity College, Dublin, has been selected by the Institute of France to fill its vacant foreign membership.

ACCORDING to the constant practice of the French Academy of Sciences, the seat occupied by M. Jamin in the Section of Physics is considered as vacant, and a new election will take place.

A MEETING was recently held in the Hall of the Institution of Civil Engineers, Great George Street, Westminster, to consider what steps should be taken to raise an Engineers' Memorial to the late Sir William Siemens. Sir Joseph Bazalgette, as President of the Institution, was asked to preside. The Chairman pointed out that a general desire had been expressed among engineers that some memorial should be raised as a recognition of the great merits and important services rendered to engineering by Sir William Siemens. It has been ascertained that it would be agreeable to the authorities of Westminster Abbey that a window should be placed in that building to the memory of the deceased. Possibly the cost of such a window might amount to

between 700*l.* and 800*l.* The meeting agreed "that it would be very desirable to commemorate the distinguished character and attainments of the late Sir William Siemens by erecting to his memory a window in Westminster Abbey." It was determined to limit the subscription in the first instance to one guinea. A committee was appointed to carry out the project.

THE ceremony of laying the foundation-stone of the building which is to be erected, under the name of Alexandra House, at the charge of Mr. Francis Cook, as a home for 100 of the female students attending classes at the Royal College of Music, the South Kensington Museum, and other art and science schools in the neighbourhood, was performed on Monday afternoon by the Princess of Wales in the presence of a large assemblage of gentlemen and ladies. Mr. Cook deserves all credit for his enlightened liberality, and we have no doubt the home which he has founded will be a valuable aid both to the South Kensington classes and the College of Music. At the same time we may remind our readers that a similar institution has been successfully at work for a considerable time in Byng Place for female students attending University College and other institutions for the higher education of women.

WE hope to be able in an early number to consider at length the report of the City Companies Commission. Meantime, among other suggestions of the Commission, we may note their recommendation to appoint by Act of Parliament a Commission to undertake (1) the application of a portion of the corporate incomes of the Companies respectively to objects of acknowledged public utility ; (2) the better application of the trust incomes of the Companies ; (3) should it prove practicable, the reorganisation of the Constitution of the Companies. The Commission moreover recommend that by the terms of such Act "objects of acknowledged public utility" be defined as scholastic and scientific objects, *i.e.* elementary education, secondary education, classical education, scientific research.

THE International Forestry Exhibition was opened on Tuesday afternoon at Edinburgh by the Marquess of Lothian, in the presence of a large company. Many foreign Governments were represented, and the Lord Provost and magistrates of Edinburgh attended in their official capacity. The Marquess of Lothian, in opening the Exhibition, said that a special object was the better forestry education of the country. The United Kingdom had more property in the world than any other nation ; but in this particular it was behind other nations. We were the only country that had not a school of forestry, and we had to send our young men abroad to gain the necessary knowledge. That, surely, was not right, and he hoped that out of that Exhibition there would come a school for forestry which might possibly be located in Edinburgh. They had every possible advantage there ; they had the Botanic Gardens, the Arboretum, the University, and the Highland Society. All these bodies took an interest in the matter, and it only required that opportunity should be given for the practical part of the work. It was not too much to hope that before long, if the money were got, they might see a school of forestry in Scotland. He appealed to the public to make the enterprise a success, and, amid hearty cheers, declared the Exhibition open.

THE Anniversary Meeting of the Sanitary Institute of Great Britain will be held in the Theatre of the Royal Institution, Albemarle Street, on Thursday, July 10, at 3 p.m. The chair will be taken by the Right Hon. Earl Fortescue, and an address will be delivered by H. C. Bartlett, Ph.D., F.C.S., entitled "Some of the Present Aspects of Practical Sanitation," and the Medals and Certificates awarded to the successful exhibitors at the Exhibition at Glasgow, in 1883, will be presented.

THE Society of Chemical Industry will hold its annual meeting at Newcastle-on-Tyne on July 9 and following days. The meeting at Newcastle is looked forward to with great interest by the members of the Society throughout the country, for Tyneside is associated more closely than any other district with the birth and development of the chief of our great chemical manufacturing industries, and the committee of the Newcastle section, under the chairmanship of Mr. J. C. Stevenson, M.P., are doing their utmost to render the visit of the members to Newcastle in every way a memorable one.

MR. SIDNEY LUPTON, Assistant Master at Harrow School, has recently compiled and published some numerical tables and constants in elementary science which we can fairly recommend to our readers. It is a little book of about 100 pages, which of course possesses no claim to originality, the whole skill of the compiler being shown in the selection of materials which he has made. The book deals with numbers and measures, heat, light, sound, electricity, chemistry, and physiography ; the latter division being wide enough to include tables of logarithms.

WE have received from the Bureau des Longitudes their "Annuaire" for the present year, which seems thicker and more complete than any of its predecessors, well worth the money it costs (1s. 3d.) even to the English reader, on account of the very valuable tables which it contains touching astronomical and geographical subjects. We notice in the present edition a very complete table of the different comets, which alone would make it a necessity in any astronomical establishment. The semi-popular article published in the "Annuaire" for this year is entitled "Sur les Grands Fleaux de la Nature"; it is by M. Faye, and is well worth reading.

M. MONTIGNY has recently published a pamphlet on the influence of the atmosphere in the apparition of colours seen in the scintillation of stars. In it he draws attention to the possibility of there being some connection between these colours and the coming weather. He has previously noticed that there is a great predominance of blue in the scintillating colour when rain is approaching, and he is now so convinced of the accuracy of this forecast that it is included among others in the *Bulletin Météorologique* published by the Observatory of Brussels. He gives the following forecast for the coming years :—"We may hope that we are happily quit of the period of wet years which commenced in 1876, and that we have already entered a series of fine years, or rather of more regular years as far as rain is concerned." *Nous verrons ce que nous verrons.*

OUR botanical readers may be interested to know that Herr F. Soácha of the Bürgschule, Deutschbrod, Bohemia, is preparing for publication a Flora of Austria-Hungary, which will contain specimens of the plants described. Those desiring to know the terms of subscription should communicate with Herr Soácha.

THE following are some of the special questions which have been arranged for discussion at the next Social Science Congress, which is to be held at Birmingham on September 17-24 :—How far are the requirements of the country for well-trained teachers in elementary schools met by the pupil-teacher system and the existing training colleges? In testing the efficiency of schools should processes or "results" be chiefly regarded? Health—1. What is the best method of dealing with (a) town sewage, (b) the products of house and street scavenging, and (c) the products of combustion? 2. What are the best means, legislative or other, of securing those improvements in the dwellings of the poor which are essential to the welfare of the community? 3. How far may the average death-rate of a population be considered

an efficient test of its sanitary condition ; and by what means can the high death-rate of children be reduced ?

THE Pavlovsk Observatory has been, since 1882, in possession of two subterranean lines, each one kilometre long, and situated, one of them in the direction of the magnetic meridian, and the other perpendicular to it ; and Dr. Wild communicates to the St. Petersburg Academy of Sciences (*Bulletin*, vol. xxix. No. 2) the following interesting results of his observations on terrestrial currents (the method of observation has already been described in the *Memoirs* of the Academy, vol. xxxi.) :—The terrestrial current altogether does not manifest itself as a current which would flow for a time in one direction and then would slowly change it, but in the shape of more or less strong alternate currents, which rapidly change their direction. The east and west force is generally stronger than that of north and south. The observations on the regulation days do not show any diurnal periodicity, neither in the force of the current nor in the number of oscillations ; but the average of the twenty-four regulation days of the year (September 1882 to September 1883) disclose such a periodicity, however feeble, namely, a maximum between 4 and 5 a.m. and a minimum at 8 p.m. for the meridional line, as also a maximum at 8 a.m. and a minimum at 1 p.m. for the other line. As soon as the force of the terrestrial current is on the increase, the magnetical instruments display perturbations which usually increase with the force of the terrestrial currents, without being, however, proportionate to them. If, according to Sir G. B. Airy, the north and south current be compared with the variations of declination, and the other current with horizontal intensity, both perturbations are often very equal, but those of the currents precede those of the terrestrial magnetism by at least five minutes. This retardation may explain the want of proportion between the variations of the current and those of the terrestrial magnetism, which proportion is the more wanting as the variations of the current are frequent and alternate. From these alternations Dr. Wild concludes that “terrestrial currents are always the primary cause of magnetic perturbations, but not of periodical variations of the magnetic elements.”

SOME forty years ago Dr. Joule raised the question whether a body that is magnetised undergoes any change in its temperature ; but the question has not yet received a definite solution, the rise of temperature which accompanies magnetisation being ascribed by some to induction currents, and not directly to magnetism. While recognising the influence of the former, Mr. Borgman has tried to show that there is also a change of temperature due to magnetisation and demagnetisation, and that the amount of heat thus disengaged is proportionate to the squares of the temporary magnetism. M. Bachmetieff, having made, at the University of Zurich, an extensive series of experiments, the first part of which is now published in the *Journal of the Russian Chemical Society* (vol. xvi. fasc. 3), arrives at the conclusion that magnetism, *by itself*, produces variations of temperature in magnetised bodies, and that this “magnetic heat” is equal to the product of the magnetic moment by the magnetising force multiplied by a constant ; it increases also, within a certain limit, with the frequency of the interruptions of the magnetising current, and increases still more when the direction of the current is alternately changed. Its amount is not equal throughout the length of an iron cylinder, reaching its maximum about its middle and decreasing towards its ends. Its cause must be searched for in purely mechanical forces, and it depends upon the speed of rotation of the molecular magnets.

ABOUT the middle of June the inhabitants of Moscow were puzzled to see immense masses of insects, taken at first for locusts, flying east in thick clouds over the city. It appears now that the insects were dragon-flies (*Libellula quadrimaculata*

and *L. rufa*) belonging to the rapacious species which live on other insects.

COUNT UVAROFF continues his archaeological explorations in the Government of Smolensk, and recently he has found very interesting remains of rude pots containing ashes and bones which are supposed to be burial remains of the Krivitchi, who had the custom, according to the Nestorian annals, of thus burying their dead.

DR. CHAVANNE, who is travelling on the Congo for the Brussels National Institute of Geography, has established a meteorological observatory at Boma. Mr. Stanley has transferred the site of his station of Vivi to a table-land some 1500 metres to the north ; and a railway from the new station to the Congo is in course of construction. A new station, called Sette-Cana, has also been established at the mouth of the small River Sette. Numerous small wooden houses are being made in Belgium to be transported to the new Vivi. A sanatorium has been constructed at Boma.

A TELEGRAM from Krasnovodsk gives the true history of the Uzboi, the ancient bed of the Amu Daria. For 250 versts, from Sarykamish to Bola Ishem, there is no stream, this locality presenting a series of desiccated marshes and lakes. At Akkal there is no channel. This part of the Uzboi, which evidently formed an estuary of the Caspian and partially fed the Sarykamish lake, has been silted up from the sea. The project for uniting the Amu Daria with the Caspian requires several hundred versts of canals.

M. JAUBERT has organised in the Great Tower of the Trocadéro Palace a repetition of the experiments tried by Pascal in the Tour Saint Jacques, on the diminution of barometric pressure with increase of altitude. He is also arranging a Foucault pendulum which will oscillate in the same condition as in the Pantheon, with a contrivance for making its vibration perpetual.

THE additions to the Zoological Society's Gardens during the past week include an Indian Wild Dog (*Canis primævus*) from India, presented by Mr. T. A. Bulkeley ; a Brush-tailed Kangaroo (*Petrogale penicillata* ♂) from New South Wales, presented by Mr. J. Abrahams ; a White-collared Mangabey (*Cercocebus collaris* ♂) from West Africa, presented by Mrs. Du Heaume ; a Black-eared Marmoset (*Hapale penicillata* ♀) from South-East Brazil, presented by Mrs. C. Spencer Stanhope ; a Guianan Tree Porcupine (*Sphingurus insidiosus*), a Rough Fox (*Canis rufus*) from British Guiana, presented by Mr. G. H. Hawayne, C.M.Z.S. ; a Laughing Kingfisher (*Dacelo giganteus*) from Australia, presented by Mrs. W. Moir ; two Chaplain Crows (*Corvus capellanus*) from Persia, presented by Mr. B. T. Finch ; a European Pond Tortoise (*Emys europea*), two Spotted Salamanders (*Salamandra maculosa*), European, presented by Mr. J. Satcherd ; two Algerian Tropidosaurs (*Tropidosaura algerica*), three Rapid Spine-foot Lizards (*Acanthodactylus vulgaris*) from North Africa, presented by Mr. W. C. Tait, C.M.Z.S. ; an Adorned Ceratophrys (*Ceratophrys ornata*) from South America, presented by Capt. Hairby ; an Orange-winged Amazon (*Chrysotis amazonica*) from South America, a St. Thomas's Conure (*Conurus xantholomus*) from St. Thomas, W.I., a Yellow Conure (*Conurus solstitialis*) from Guiana, two Passerine Parrots (*Psittacula passerina*) from British Guiana, deposited ; a Bengal Vulture (*Gyps bengalensis*) from India, two Coscoroba Swans (*Cygnus coscoroba*) from Chili, three Turquoise Parrakeets (*Euphema pulchella*) from New South Wales, purchased ; two Black Guillemots (*Uria grylle*) from Ireland, received in exchange ; a Hog Deer (*Cervus porcinus* ♀), four Himalayan Monauls (*Lophophorus impeyanus*), five Chilian Pintails (*Dafila spinicauda*), five Summer Ducks (*Ex sponsa*), bred in the Gardens.